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PATENT & TRADEMARK OFFICE

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In re Applicant:	Everardo D. Ruiz	§	Art Unit:	2613
Serial No.:	10/751,082	§	Examiner:	Dzung D. Tran
Filed:	December 31, 2003	§	Docket:	ITL.1089US P18427
For:	Isolating Radio Frequency Components of a Wireless Device	§	Assignee:	Intel Corporation

Mail Stop **Amendment**
Commissioner for Patents
P.O. Box 1450
Alexandria, VA 22313-1450

DECLARATION UNDER 37 C.F.R. 1.131

Sir:

I, Timothy N. Trop, declare as follows:

1. I am the attorney why drafted and prosecuted the above-referenced patent application.

2. I have attempted to contact the sole inventor and have determined that he is no longer employed by Intel. Further, I have been unable to locate him.

3. I am a party in interest, with respect to the application, as a prosecuting attorney and as the attorney of record for the Assignee.

4. I have personal knowledge of the following facts:

   a. The inventor in the present application submitted a Declaration to the patent department of the Assignee that is dated prior to the filing date of the cited reference, the application of Bjorndahl;

Date of Deposit: January 29, 2007
I hereby certify under 37 CFR 1.8(a) that this correspondence is being deposited with the United States Postal Service as **first class mail** with sufficient postage on the date indicated above and is addressed to the Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450.

Cynthia L. Hayden

b. The Assignee of this application typically undertakes an invention review process to determine whether or not to file an application;

c. I received this application for prosecution within the normal amount of time that the process of determining whether to file takes at the Assignee; and

d. I prepared and filed the application in less than a month after receiving the application for application filing.

5. Attached is a true and correct copy of the invention disclosure submitted by the inventor to the Assignee's patent department with its date redacted.

6. All of the elements set forth in the claims are shown in the disclosure and, specifically, the optical isolation is shown, for example, in paragraph 3 on the third page, in the form of an optical waveguide and an optical receiver in the transmit path and the receive path. In this case, the low noise amplifier in the receive path is isolated from lower frequency components to the right of the RF to IF section. Therefore, the elements of claims 1 and 9 are shown in the disclosure.

With respect to claim 17, a controller is represented by the processing circuits shown on page 3, in the drawing of Figure 3, in the receive path at the end, right before received data.

7. I hereby declare that all statements made herein of my own knowledge are true and all statements may on information and belief are believed to be true; and, further, that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

Date: 1/29/2007

Timothy N. Trop

ITL.1089US

INTEL INVENTION DISCLOSURE

ATTORNEY-CLIENT PRIVILEGED COMMUNICATION
located at http://legal.intel.com/patent/index.asp
Rev. 17 – January 2003

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P18427

WIRELESS/IC/CS

It is important to provide accurate and detailed information on this form. The information will be used to evaluate your invention for possible filing as a patent application. **Invention Disclosure forms MUST be sent electronically via email to your manager/supervisor who should then forward with their approval to our email account "invention disclosure submission."** If you have any questions, please call **8-264-0444.**

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Home Address:			
City:	State:	Zip:	Country:
Corporate Level Group:	Division:		Subdivision:
Supervisor:	WWID:	M/S:	Phone #:

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Home Address:			
City:	State:	Zip:	Country:
Corporate Level Group:	Division:		Subdivision:
Supervisor:	WWID:	M/S:	Phone #:

(PROVIDE SAME INFORMATION AS ABOVE FOR EACH ADDITIONAL INVENTOR)

2. Title of Invention:
High-performance radio

3. What technology/product/process (code name) does your invention relate to (be specific if you can)
Centrino technology, Mobile Pentium and Pentium technology, ultrawideband (UWB) radio, and software defined radio

4. Include several key words to describe the technology area of the invention in addition to # 3 above:
Optical antenna remoting

5. Stage of development (i.e. % complete, simulations done, test chips if any, etc.):
A prototype of this device has not been constructed. The remote antenna concept has been demonstrated by the inventor in a small form factor for another application.

6a. Has a description of your invention been (or planned to be) published outside of Intel: No

If YES, was the manuscript submitted for pre-publication approval through the Author Incentive Program:

If YES, please identify the publication and the date published:

6b. Has your invention been used/sold or planned to be used/sold by Intel or others? Not yet, although trend appears to point in this direction.

If YES, date it was sold or will be sold:

6c. Is a SIG (special interest group) active in this technology? No

If YES, name of SIG:

6d. If the invention is embodied in a semiconductor device, actual or anticipated date of tapeout?
No tapeout is scheduled.

6e. If the invention is software, actual or anticipated date of any beta tests outside Intel: The invention is not software.

7. Was the invention conceived or constructed in collaboration with anyone other than an Intel blue badge employee or in performance of a project involving entities other than Intel (e.g. government, other companies, universities or consortia)? NO: XX If YES, name of individual or entity:

8. Is this invention related to any other invention disclosure that you have recently submitted? If so, please give the title and inventors: No

PLEASE READ AND FOLLOW THE DIRECTIONS ON HOW TO WRITE A DESCRIPTION OF YOUR INVENTION

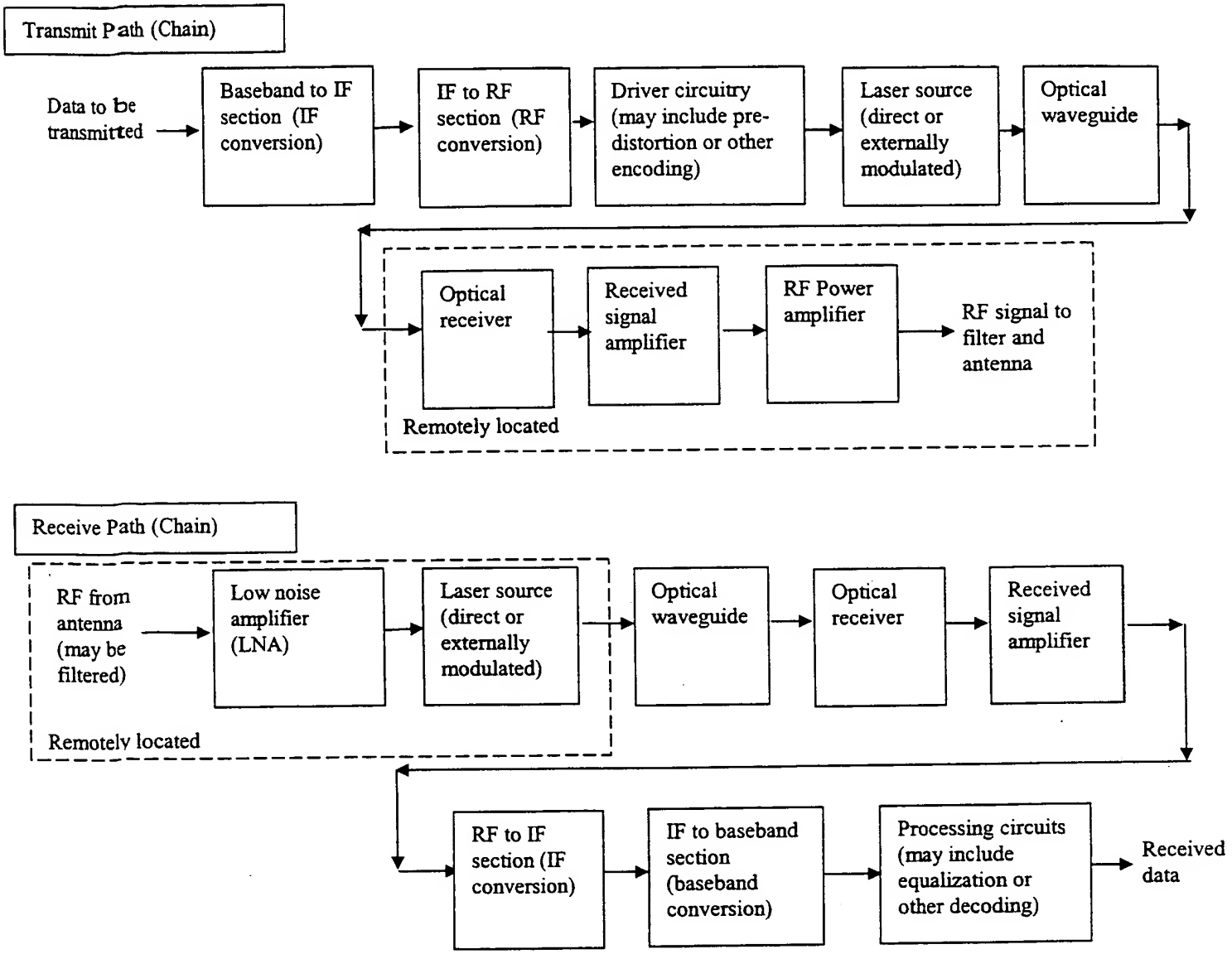
Try to limit your description to 2-3 pages
Do NOT attach a presentation, white paper, or specification
ANSWER ALL OF THE QUESTIONS BELOW

Please provide a description of the invention and include the following information:

1. **Describe in detail what the components of the invention are and how the invention works.**
Digital radios can be divided into blocks which operate at radio frequency (carrier frequency), one or more intermediate frequencies (IF), and baseband (or baseband at a very low IF). This invention partitions and physically separates the high power RF section (the power amplifier) and RF LNA (low noise amplifier) from the IF section, baseband section, and CPU using a fiber optic link.

2. **Describe advantage(s) of your invention over what is currently being done.**
The RF section of the radio includes an RF LNA on the receiver chain and an RF PA on the transmit chain.
Isolating the RF section (including the antenna) from other portions of the radio (typically located near the CPU) achieves:
(1) improved receiver sensitivity (lower noise figure due to nearly zero RF path loss from antenna to LNA),
(2) improved transmitter power efficiency (near zero path loss from PA to antenna),
(3) the radio can upgraded with software (running on Intel silicon) to process IF and baseband radio signals (as a reconfigurable, software defined radio).

3. **You MUST include at least one figure illustrating the invention. If the invention relates to software, include a flowchart or pseudo-code representation of the algorithm.**



4. **Value of your invention to Intel (how will it be used?).**
The fiber optic remote RF and antenna concept can be applied both mobile and desktop PC form factors. By using a low loss link to remote the antenna to the highest point on the computer, typically inside or on top of the display, the received signal strength is increased while interference from the CPU and associated chip set is reduced. Additional noise from lossy cabling is also removed which further improves receiver noise figure.

As a system, optical antenna remoting has the effect of significantly improving the user experience by increasing the available wireless data rate and wireless link reliability. When used with transmit power control, it also reduces co-channel jamming to other users in the network, leading to greater spectral efficiency, and hence, more users per wireless access point or wireless base station.

Using fiber optic cable to remote the RF (PA and LNA) and antenna allows the radio to be partitioned such that the bulk of (or entire) non-RF portion of the radio can be located near or inside Intel products, maximizing value captured by Intel silicon and software.

5. **Explain how your invention is novel. If the technology itself is not new, explain what makes it different.**
The concept of antenna remoting has been used in large military radar systems, but to the inventor's knowledge, the use of fiber optics to remote the RF LNA, PA, and antenna in notebook and desktop PCs has not been demonstrated. Low cost optical components are emerging today which make a cost effective solution possible.

Power and weight savings may be realized which further enhance the user experience if this technology is employed in a notebook or tablet computer form factor.

6. **Identify the closest or most pertinent prior art that you are aware of.**
Prior art tends to focus on cellular/PCS radio base stations and not the client (i.e. mobile station or remote PC). Some of this art as described in the USPTO database is:

5,969,837	Communications system
4,339,184	Fiber optic antenna remoting for multi-sector cell sites
6,178,334	Cellular/PCS network with distributed-RF base station
6,078,622	Distributed digital radio system

7. **Who is likely to want to use this invention or infringe the patent if one is obtained?**
Desktop, notebook, and tablet integrators and manufacturers.

8. **How would infringement be detected?**
Purchase of a potentially infringing product followed by visual inspection.

HAVE YOUR MANAGER/SUPERVISOR READ AND FORWARD THIS DISCLOSURE ELECTRONICALLY VIA E-MAIL TO "INVENTION DISCLOSURE SUBMISSION"

BY APPROVING, YOUR MANAGER/SUPERVISOR IS ACKNOWLEDGING THAT THE DISCLOSURE HAS BEEN READ AND UNDERSTOOD, AND RECOMMENDS THAT THE DISCLOSURE AWARD BE PAID